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Animal Keepers' Forum

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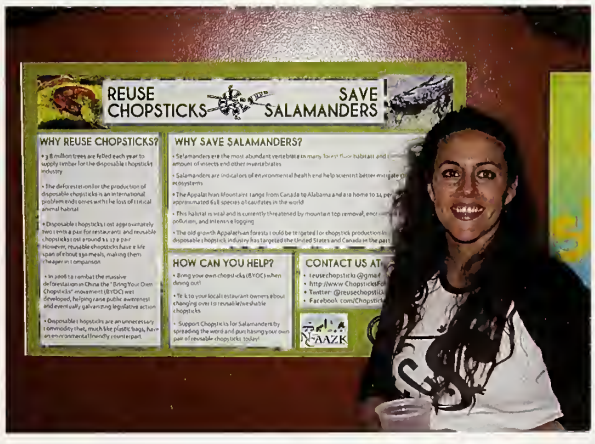

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American Association of Zoo Keepers, Inc.

The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

About the Cover

This month's cover comes to us from Craig Salvas of Smithsonian's National Zoological Park. The photo features a Sumatran tiger *(Panthera tigris sumatrae)* named "Damai" as she stretches and sharpens her claws out on exhibit. With their compact bodies and striking markings, Sumatran tigers are one of the smallest of the remaining tiger subspecies. With only an estimated 400 left in the wild, Sumatran tigers are listed as critically endangered due to habitat loss and illegal trade.

Damai is a part of the Sumatran tiger SSP and is doing her part to participate. She successfully raised two cubs and is a beautiful ambassador of the species. Damai has future plans to be introduced to a new mate this spring.

Articles sent to ***Animal Keepers' Forum*** will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for ***AKF***. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

Deadline for each regular issue is the 3rd of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

Articles printed do not necessarily reflect the opinions of the ***AKF*** staff or the American Association of Zoo Keepers, Inc. Publication does not indicate endorsement by the Association.

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FROM THE PRESIDENT

I remember how cold and snowy New York winters are, and at the time I worked with California sea lions. The exhibit was made of natural rocks inlaid in cement and boy did it get icy. Once, when I was feeding the sea lions, I slipped and fell right in the pool. I don't know who was more surprised, me or the sea lion! I was wearing insulated Carhartt® bib overalls, which started to freeze immediately after I climbed out of the water. I remember as I walked back to the main building, I kept saying, "I'm so cold" over and over.

I know many of you are working in harsh weather conditions this time of year. Sometimes we get in a hurry to get out of the cold, but we still need to think of safety for ourselves and the animals first. Whether it is making sure heat lamps are secure or paying attention to our fingers and toes and heeding the early warning signs leading to frostbite. Take a moment to be aware of your surroundings.

I want to highlight our new Safety Committee, which will provide resources and opportunities for safety and health training. They will be developing Safety materials and resources for:

- Hazard Recognition - General Safety for Keepers and Aquarists
- Crisis Management
- Emergency Management
- Zoonotic Disease
- Dive Safety
- Development for on-the-job safety tips, articles for online media, and a curriculum for a 2017 Keeper Safety Course

Kelly Murphy from the North Carolina Zoo is a Co-Chair and is looking for members for the committee. You may contact her at Kelly.Murphy@aazk.org.

On another note, AAZK has several grants available to help you pursue your interests, passion and professional development. You can find information and applications on the AAZK website and they must be submitted by March 1.

Stay warm and stay safe,

Penny Jolly
Penny.jolly@aazk.org

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COMING EVENTS

Post upcoming events here!
e-mail shane.good@aazk.org

March 2, 2016
3rd Annual Regional Symposium
Washington D.C.
Hosted by NCAAZK at the Smithsonian's National Zoo
For more information go to: ncaazk.org
"Using creative problem solving to improve animal care."

March 19-24, 2016
AZA Mid-Year Conference
Omaha, NE
Hosted by Omaha's Henry Doorly Zoo and Aquarium
For more information go to: aza.org/midyearmeeting/

April 17-22, 2016
ABMA National Conference
Tampa, FL
Hosted by Lowry Park Zoo and Busch Gardens Tampa
For more information go to: theabma.org/abma-annual-conference/

April 29 - May 1, 2016
Reconnecting with Elephants in Protected Contact Workshop (RECON)
Colorado Springs, CO
Hosted by Cheyenne Mountain Zoo, Steve Martin of NEI and Dr. Susan Friedman. For more information go to: www.cmzoo.org/index.php/recon-elephant-workshop/

May 9-12, 2016
The International Giraffid Conference
Chicago, IL
Hosted by Brookfield Zoo
For more information go to: https://www.czs.org/giraffid

May 12-17, 2016
Best Practices in Animal Keeping Course
Buffalo, NY
Hosted by AZA and Buffalo Zoo
For more information go to: https://www.aza.org/BPAK.aspx

June 12-16, 2016
24th International Conference on Bear Research & Management
Anchorage, AK
International Association for Bear Research and Management
For more information go to: www.iba2016.com

June 22-25, 2016
International Herpetological Symposium
St. Louis, MO
Hosted by Saint Louis Zoo
For more information go to the International Herpetological Symposium website.

September 7-11, 2016
AZA National Conference
San Diego, CA
Hosted by San Diego Zoo Global and SeaWorld San Diego
For more information go to: www.aza.org/annualconference/

AMERICAN ASSOCIATION of ZOO KEEPERS

September 19-23, 2016
AAZK National Conference
Memphis, TN

Hosted by Memphis Zoo AAZK Chapter and Memphis Zoo.

MemphisZoo.org/AAZK-Conference

September 25-30, 2016
International Aquarium Congress
Vancouver, BC
Hosted by The Vancouver Aquarium Marine Science Centre
For more information go to: http://iac2016.venuewest.com/

Available Grants

So you don't have enough funding to cover the conference, research or conservation project you would like to do? Well, look no further! AAZK offers three exciting grants to help you grow in your career as a zoo keeper. Applications and guidelines for each grant can be found on the AAZK website. The deadline for all three grants is March 1 so start planning now so you won't miss your chance to apply. If you have questions, please contact Jessica Munson at jessica.munson@aazk.org.

THE AAZK PROFESSIONAL DEVELOPMENT GRANT

The AAZK Professional Development Grant is designed to assist AAZK members with costs associated with attending professional meetings or workshops, or participating in field research. There is a total of $2000 for this grant; amount can be divided among applicants. Deadline is March 1.

Qualifications: Full-time keepers/aquarists in zoological parks and aquariums, who are professional members of AAZK, Inc. in good standing, are eligible to receive grants.

THE AAZK RESEARCH GRANT

The purpose of the AAZK Research Committee's Zoo Keeper Grant in Research is to encourage and support efforts in non-invasive research conducted by AAZK members in zoological parks and aquariums around the world. There is a total of $2000 for this grant; amount can be divided among applicants. Deadline is March 1.

Qualifications: Full-time keepers/aquarists in zoological parks and aquariums, who are professional members of AAZK, Inc. in good standing, are eligible to receive grants. Researchers other than zoo keepers may participate in the funded studies. The principal investigator, however, must be a keeper/aquarist.

THE AAZK CONSERVATION, PRESERVATION AND RESTORATION GRANT

The purpose of the AAZK CPR Committee's Zoo Keeper Grant in Conservation is to encourage and support efforts in conservation conducted by AAZK members in zoological parks and aquariums around the world. There is a total of $1000 for this grant, amount can be divided among applicants. Deadline is March 1.

Qualifications: Members of the AAZK, Inc. in good standing are eligible to apply and receive grants. The member must have an active role in the conservation effort submitted for consideration. Because of the nature of conservation projects, the scope of the project or number of people involved will not be restricted.

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Thursday, September 22nd
Presentations and Workshops

Friday, September 23rd
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Farewell Banquet

First Call for Papers/Poster Abstracts:
March 15, 2016
Deadline for Abstracts:
May 15, 2016

Website: MemphisZoo.org/AAZK-Conference • E-mail: AAZK2016@memphiszoo.org

Utilization of Zoo Enclosures in Capuchin and Spider Monkeys

Laura Danielczyk, Graduate Student
Brookfield Zoo
Brookfield, IL

Abstract

New World monkey species *Cebus* (capuchin) and *Ateles* (spider) spend the vast majority of their time in the wild in tree canopies. Feeling much more at ease by climbing and scaling the treetops, both species spend little time on the ground. This behavior is also seen in captivity as both species enjoy staying in the higher parts of their enclosure instead of at the ground level. How each species utilizes their enclosure space while living in captivity is important for zoo keepers to take note of, as it can help to better build and maintain captive enclosures. Since both feel comfortable in the treetops, this study focused on the number of instances that the capuchin and the spider monkeys climb through their enclosures in captivity. An observational experiment was designed to study and monitor the number of instances that both species climbed and moved through their enclosure. A number of different actions and activities were also measured for comparison purposes. A total number of twelve days of observation were needed in order to accurately observe both species' activity. In order to analyze the data, the numbers from each species were averaged and totaled, then transferred to a variety of different graphs for summarizing purposes.

By comparing both New World monkey species, the purpose was to see which one would climb in their enclosure more. The hypothesis was that spider monkeys would climb more inside their enclosures than the capuchins. This hypothesis was made from prior background knowledge and by doing a sample observation of both species prior to the actual experiment. After careful observation and analyzing of data points by converting the numbers into pie, bar, and line graphs, the hypothesis is supported. Spider monkeys do climb more in their enclosure than the capuchin monkeys. This study does pose a number of additional

questions regarding the amount of time each species spends climbing. It is important to understand and take note of what actions each species does in captivity when not moving and climbing. As both spider monkeys and capuchins are extremely intelligent New World monkey species, it is incredibly important that they are stimulated both physically and mentally in captive settings.

Introduction

Spider monkeys and capuchin monkeys are two of the most widely dispersed species of New World monkeys found in Central and South America. Both species share many common traits and behaviors seen in the wild and in captivity. The spider monkey is considered one of the largest New World monkeys. Anatomically, they stand out amongst other New World primates due to their long limbs, fully prehensile tail, and lack of thumb. They are one of the few species to have a true prehensile tail with the tip of their tail covered in rough skin similar to the skin on a human's fingertips, rather than fur. This adaptation allows them to easily climb, and swing through the dense forest canopies. Their color variation can vary between black, grey, white, and red faced. Their social structure is unique among other primate species found in Central and South America. This is because of their fission-fusion organization, which is similar to that of the chimpanzee (Kinzey, 1997). This dynamic helps spider monkeys reduce competition over high-quality food sources by breaking up into smaller foraging communities. Their groups consist of multiple females, and males varying in size, and when foraging they separate into smaller subgroups. The males are philopatric and will stay with the group throughout their lives, however the females will emigrate when they become sexually mature.

Though they have a great geographic distribution, their numbers are dwindling due to habitat loss, environmental degradation, and hunting. They are found in evergreen tropical rain forests and prefer wet forests to dry forests. Spider monkeys spend the majority of their lives in the higher canopies, which suits their body frame of long limbs and thin bodies. Their movements are very acrobatic as they use forward locomotion to move and jump. They are primarily frugivores, their diets consisting almost entirely of fruit. As frugivores, it is estimated that 90% of their total food intake consists of fruit or nuts (Campbell, 2008). If fruits are scarce they will eat leaves, flowers, seeds, aerial roots, and palm hearts. Some have been seen in the wild consuming decaying wood, and invertebrates. This fruit-based diet coupled with their ability to swallow and pass seeds intact helps make them effective seed dispersers throughout their habitat. It is their diet which affects their wide range and dispersion. Each group could have home ranges as large as 390 hectares of continuous forests. The males of each group can be territorial and will defend their home range. Searching for ripe fruit to eat does take a vast amount of time; what's left of their time is spent resting. While the traits outlined above are some of the common behaviors of spider monkeys in the wild, their behaviors in captivity are strikingly similar.

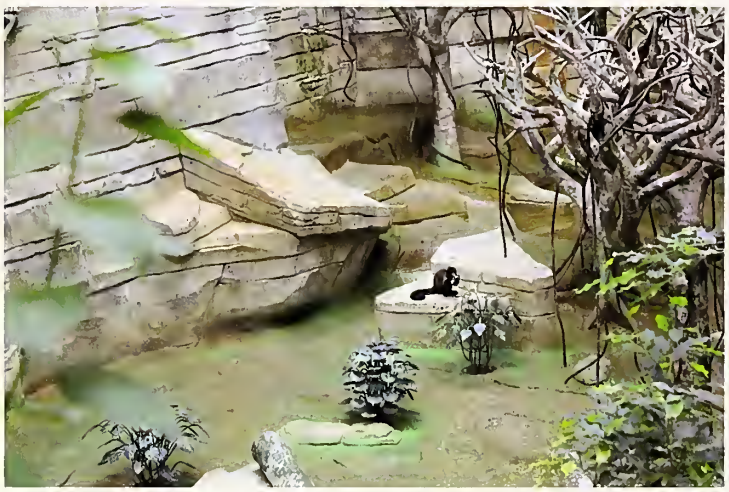
In captivity they spend the majority of their time either resting or climbing and swinging on the highest parts of their enclosure. Just like in the wild they do spend their days in the company of others and prefer to be social rather than solitary. Social interactions among spider monkeys include resting and eating together, and even grooming. Compared to similar species, grooming activities between spider monkeys is less involved due to the lack of the opposable thumb. When playing in captivity, they enjoy having enrichment toys in their enclosure so as to keep them occupied and stimulated. Unlike other species of primate living in captivity, the spider monkey can live with a variety of different species without any issues. Ensuring that keepers have given these monkeys enough space and adequate room to climb is key for their success in captivity. They also can display neurotic behavior if kept alone without company. With proper nutrition, enrichment and enough space spider monkeys can thrive in captivity.

The capuchin monkey is often considered to be one of the most intelligent of all the New World monkeys. Their success in a variety of different habitats is due to their behaviors and their opportunistic personalities. They eat both plant and animal and have a great ability to forage in order to find this food. They are considered omnivores as they prefer fruits and plants but will eat insects, frogs, eggs, and even small mammals if they can catch them. What they eat also depends on where the capuchins are located. The white-faced species, which reside in Central America, eats more plants, with fruit making up 78% of their diet. However in South America species such as the tufted capuchin only eat 14.4% protein, 26.3% carbohydrate/sugars, 15.8% fat, 7.6% cellulose, and 36% minerals (Fragaszy et al., 2004). Capuchins, unlike most other species of New World monkeys, will share food with one another. They will regularly share food outside the parent-offspring context; this sharing is of a passive type (Hattori et al., 2012). Capuchins will engage in food sharing both in the wild and in captivity.

Capuchins are a medium to large size species of monkey with the males growing larger than the females. These agile monkeys have a robust body, long legs, arms and a tail about as long as their body. Both their hands and feet have fully functional opposable thumbs. While their tail can grasp branches, and can be used for climbing, it is considered a semi-prehensile tail due to the lack of fleshy skin at the tip. They are social animals living in groups that are multi-male, and multi-female. There is both an alpha male and alpha female, however it is clear that the alpha male is in charge. In their society the subordinate males, lesser females, juveniles, and infants first follow the alpha male and female. However, when it comes to eating first, the subordinate males usually are last in line to eat. In their social groups, allies are considered most important, especially for males. A subordinate male will rarely have the support of other members to accomplish their goals (Perry, 2008). While females generally interact well with each other, grooming each other frequently and getting along peacefully with each other, male interactions with each other are tense.

A capuchin's preferred habitat is a variety of forest types but they prefer the canopy-covered forest. They are found in humid and dry forests, swamp forests, seasonally flooded forest, mangrove forests, as well as forests that have seasonal dry periods for six months out of the year. While they will rest in the middle canopies of trees they will travel on the ground to search for food. Capuchins are active from sun up to sun down searching and foraging for food. They travel throughout the entire day and do not reach their resting trees until dusk. However, their activity pattern does change in between the wet and dry season. They are generally more active during the wet season when food is most abundant. Capuchins are perhaps the most well known of all primate species found in the tropic world due to their ability to use and manipulate tools. These versatile primates have been seen using feeding tools for digging, cracking and probing. Approximately 65% of their most frequent type of tool use was digging with stones for tubers, roots, or insects (Moura, 2004). This digging technique has not been found in any other primate besides humans.

In captivity capuchins are just as fascinating. They can survive and co-exist with a multitude of species in captivity. The key to their success in captivity is adequate living space, a variety of food and a great deal of enrichment. Because of their incredible intelligence, if not constantly engaged or stimulated, capuchins will become bored and will begin to display neurotic, depressive behavior. Being social animals they need companionship of other primates or they can grow quite depressed. Their short attention span can cause them to pace frequently in the enclosure, and display a number of other neurotic behaviors. Enrichment therefore is key to their success and proper enrichment toys need to be available for capuchins on a regular basis to promote learning and positive behavior. Capuchins in captivity are easily trainable for a



number of different tasks, some of which are incredibly complex. They are often used in laboratory research due to their intelligence and have been studied doing behaviors not yet seen in other New World primates. For instance, one experiment done on a captive group of capuchins revealed that capuchins could not only acknowledge the help of others, they will reward their companions as well (Takimoto and Fujita, 2010). Capuchins have been observed being sensitive to the labor of others and will give food to a partner who has helped them to complete a task (Takimoto and Fujita, 2010). This animal's intelligence allows them to understand the meaning between cause and effect, which allows them to pick up on the behavioral actions of other primates.

Both the spider monkey and capuchin are found in the same habitats in the wild and have similar behaviors and traits. This is why it is important to see how they both behave in captivity. Due to their size and agile climbing ability, studying how active they are and how they utilize their enclosure is valuable information for their keepers. This study investigates whether the spider monkey will be seen climbing more in their enclosure than that of the capuchin monkey. Since they both share the same enclosure, observations will focus on the number of times that each species is seen climbing within that enclosure. Based on prior knowledge and understanding of both species it's hypothesized that the spider monkeys will be seen climbing more regularly than the capuchins. The goal of this study is to compare the amount of time that both spider monkeys and capuchins climb. Comparing this, as well as a number of other behaviors being observed, will help zoologists and animal keepers better understand their behaviors in captivity, so that they can better care for these animals.

Methods

Data were collected on the spider monkeys and capuchin monkeys at Brookfield Zoo's Tropic World exhibit. This is a large indoor exhibit with no access to the outside; animals are kept strictly inside at all times. The exhibit itself is quite large and houses numerous animals. The South America portion of Tropic World is where both capuchin monkeys and spider monkeys share their enclosure. They also share this space with the callimico's, cotton-top tamarin, greater anteater, two-toed sloth, and a variety of tropical birds. The callimicos and sloth share a portion of their habitat together that is not accessible to any of the other animals; this is also the case with the cotton-top tamarin. The spider monkeys, capuchins, greater anteater, and birds all share the rest of the exhibit. The exhibit itself is very large and offers a wide array of trees and rocks to climb, as well as plenty of ropes, and vines to swing from. There is a small river/pond on the ground level and there is "rain fall" every day by the sprinkler system. The large rocks, which are in the back of the enclosure, have large enough ledges for the animals to rest or walk on. The capuchins residing in Tropic World are tufted capuchins; these are a hardier, more robust, and slightly larger capuchin out of the *Cebus* family. They are quite distinguishable due to the tufts that can be seen on top of their heads. These are called the tufts and two out of the three capuchins have this noticeable trait. The third capuchin, which is also a tufted, does not have this trademark, however because of his robust body and his black cap with dark sideburns we can easily tell he is also a tufted capuchin. The black handed spider monkey, also known as the Geoffroy's spider monkey, also resides in this enclosure and they are easily distinguishable by their black face with rings around their eyes. Their hands, feet, elbows, and knees are black while their bodies are a white, cinnamon, or cream colored. Their legs, arms, and tails are incredibly long compared to their compact body and these long limbs set them apart from the other primates in this enclosure. There are five Geoffroy's spider monkeys in the South America portion of Tropic World. There is also a red-faced black spider monkey that resides there as well. She is most certainly distinguishable from her other companions as her fur is completely black, and she has a bright red face. Her body structure is the same as the Geoffroy's spider monkeys that live with her.

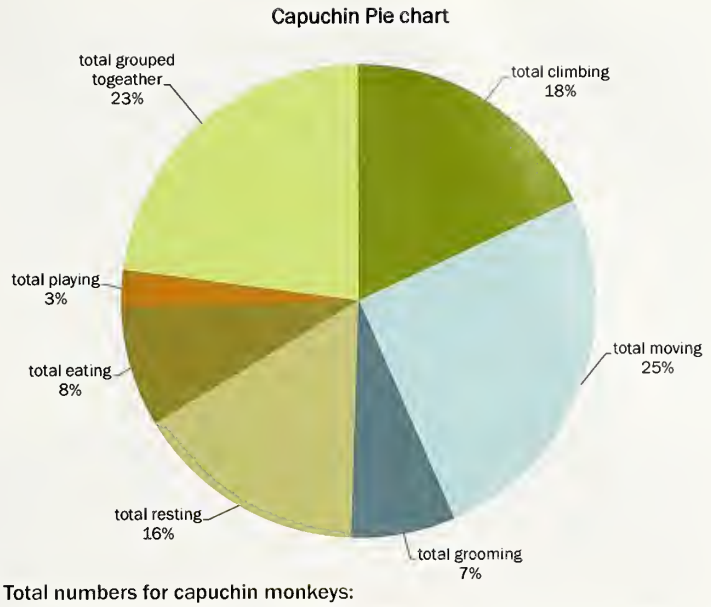
The social hierarchy for both the spider monkey and capuchins living in Brookfield Zoo is unknown. Since the purpose of this study was focused on climbing as well as behavior the social hierarchy is not a factor.

A data table or ethogram was created in order to take observations of both the capuchins and the spider monkeys. This ethogram included a number of different behaviors including: climbing, moving, grooming, resting, eating, playing, and grouped together. The table was broken down by time with a section to mark down observations every minute, for a total observation period of twenty minutes. There was also a total table created which added up every observation taken in the twelve-day span. A sample observation was done before the table was created in order to get an idea of the setup of enclosure as well as see firsthand how both species behave. Because the focus of the study is the frequency in which each species climbs in their enclosure we can consider the behavior of climbing as an event. The defining event was climbing, and the behavior was scored only if the event occurred when the minute was up. One-Zero was the sampling method used to tally the behaviors of all capuchins, and all spider monkeys within the enclosure. In order to keep count of the behaviors, each behavior was only counted if they occurred when the minute was up. A one was then recorded within the box coordinating to that behavior, with a zero inputted if they did not act out the desired behavior. A total of twelve observation days were needed to gather enough data points. The time of day varied with each day of observations; with four days having two separate observation times (morning, late afternoon). A total of sixteen observation times were used for each species; each observation was done for a total of twenty minutes.

The definition of climbing used was a locomotion movement climbing up or down, forwards or backwards within the enclosure. If the primate was swinging, hanging, standing still, or walking this was not counted, as it did not fall into the climbing definition used. Climbing is a very natural behavior for both primate species and since they spend the majority of their time in high places the focus was the frequency of climbing, not the length of time spent climbing. Two species of animals were studied during this project. Each species was observed for twenty-minute periods each day. These twenty-minute periods and days were randomly selected. Observations took place during zoo hours when visitors were frequently seen in Tropic World. Weekdays usually yielded fewer visitors, however the number of visitors seemed to have little effect on the behaviors of both species. Each species had a total of 320 data points (12 days/16 times, 20 minute intervals). One important variable to note was that there were four days in which the capuchins were not present in the enclosure. The observations data for these days were zeros. After data were collected, they was then added to get the total for each species. Data were then divided by the number of observations (16 total) to get the average for each species. Graphs were then used to show the percentages of time spent doing each behavior being observed per species, as well as comparing the two species together.

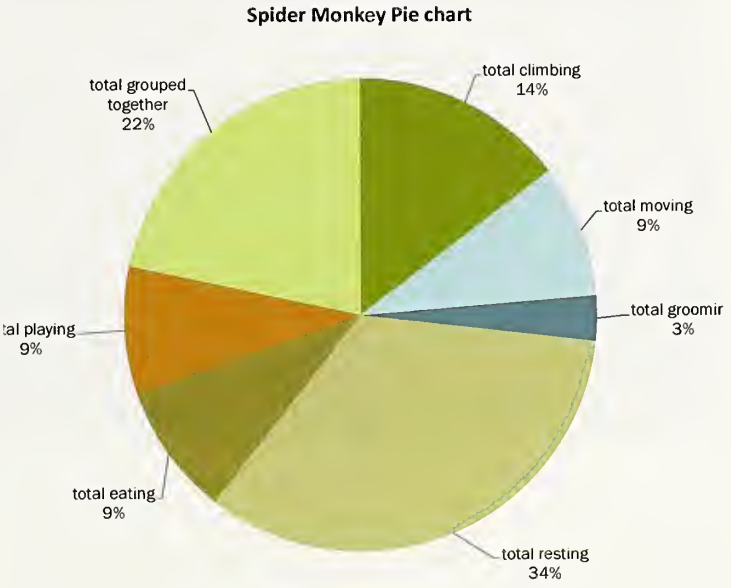
Results

Data analysis included totaling each behavior observed for each species. Total behaviors were shown using a pie graph for each species. These pie charts represent the total percentages of each behavior undertaken by both spider monkeys and capuchins. Spider monkeys were counted climbing in more instances than capuchins, however when accounting every behavior they only climbed 14% of the total time. Based on analyzed data, capuchins climbed 18% of the total time.



Total numbers for capuchin monkeys:
Total climbing: 64, Total moving: 90, Total grooming: 25, Total resting: 56, Total eating: 29, Total playing: 9, Total instances grouped together: 81

Figure 1. Shows total percentages of capuchins engaging in each activity.



Total numbers for spider monkeys:
Total climbing: 94, Total Moving: 58, Total grooming: 20, Total resting: 217, Total eating: 58, Total playing: 56, Total instances grouped together: 139

Figure 2. Shows total percentages of spider monkeys engaging in each activity.

When looking at total numbers it appears as though spider monkeys climbed less total time overall than capuchins. However, when the data are averaged and compared, spider monkeys are shown to climb more frequently than capuchins. The side-by-side comparison, which is displayed in a bar graph, shows the number of instances each behavior was recorded. The capuchin's percentages were lower due to the lack of observations. This bar graph was created using the cumulative totals, for each behavior observed. The blue colored bar represents the capuchin monkey, while the green colored bar represents the spider monkey. The numbers at the bottom represent each behavior. 1 (total climbing), 2 (total moving), 3 (total grooming), 4 (total resting), 5 (total eating), 6 (total playing), 7 (total grouped together)

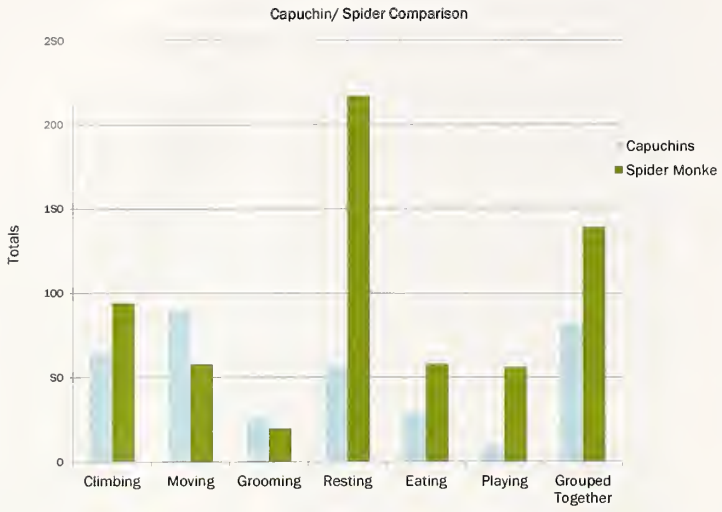
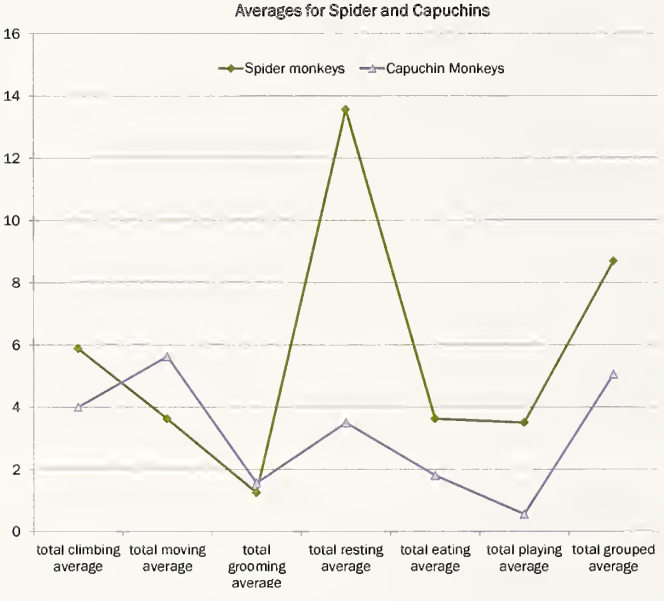


Figure 3. Shows a side-by-side comparison of number of times each behavior was recorded for both spider and capuchin monkeys.

A line graph shows the averages of each behavior for both species. The averages were taken by totaling each behavior and dividing it by the total number of observations recorded. This calculation provided the average mean observed for each primate species studied. This line graph shows the spider monkeys are having a higher average of occurrence of climbing than those of the capuchins. The climbing average for the spider monkey is one point greater than that of the capuchins. The resting average for spider monkeys was much higher than those of the capuchins, while the grooming average was close to the same for both.



Spider Monkey Total Averages: Total climbing: 5.88, Total Moving: 3.63, Total Grooming: 1.25, Total Resting: 13.56, Total Eating: 3.63, Total Playing: 3.5, Total Grouped Together: 8.69.

Capuchin Monkey Total Averages: Total Climbing: 4, Total Moving: 5.63, Total Grooming: 1.56, Total Resting: 3.5, Total Eating: 1.81, Total Playing: .56, Total Grouped Together: 5.06.

Figure 4. Line graph shows the total averages for each species in comparison to each other.

Discussion

Spider Monkey Behavior

This study was done to observe both the capuchin and spider monkey in captivity, and to monitor their activity patterns. While it was predicted that spider monkeys would be observed climbing more often, capuchins spent 4% more of their time during the observed study period climbing compared to spider monkeys. This observed difference in behaviors could be attributed to the spider monkeys receiving more observation intervals than capuchins. As discussed earlier, the spider monkeys have a greater number of data points to graph than the capuchins, which is why the pie chart shows capuchins climbing more. The pie chart would not support our hypothesis that spider monkeys indeed climb more than the capuchin.

Figure 3 shows spider monkeys climbing more often than the capuchin monkeys by more than 20%. Out of all the instances being counted over the sixteen observational periods it was the spider monkey that was recorded climbing more often than the capuchin. The bar graph shows the greater number of data points recorded on the spider monkey in almost every behavior except for grooming, and moving. It is highly likely the spider monkey had a higher total as they were observed more times than the capuchins. Through various data analysis methods, the information collected during this research supports the hypothesis that spider monkeys climb more than capuchin monkeys in a captive setting. The total instances recorded of spider monkeys climbing was 94, where as the capuchin was only counted 64 times climbing. The third graph further demonstrates that spider monkeys climb more than capuchins. When the averages were figured for each total behavior recorded and then compared on a line graph it still shows that spider monkeys did climb more than capuchins.

Indeed more days of observation are needed in order to get a better idea of the consistency of observed behaviors in both species. While observations did occur during a number of different times throughout the day, there were no observations done at night, or early morning hours. There is a possibility that the data could change if observations were possible during those time periods. Longer durations of observation may also have yielded more results, as the duration was only twenty minutes at a time. A study could be conducted timing the behaviors as well. This study focused only on counting the number of instances the behaviors occurred. It would be helpful and interesting to note how long each behavior took place. There were a number of different behaviors not covered in this study that could be observed and studied as well. For example, the number of times that interspecies interactions take place, fighting, feeding patterns, drinking patterns, and so forth.

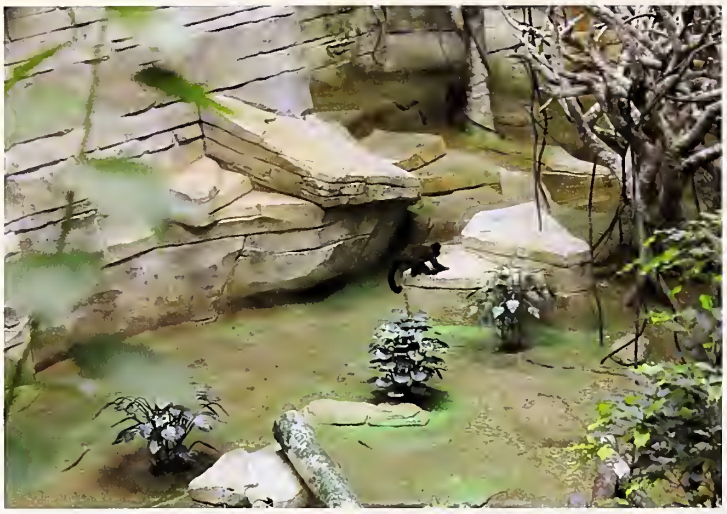
The data does support the fact that spider monkeys spend a large portion of their time climbing. The climbing behavior observed in this study includes the locomotor mode, also known as a vertical climb. This is characterized by diagonal sequences and diagonal couplets, which is where the foot leaves the support first, followed by the contralateral forelimb (Campbell, 2008). Spider monkeys also clamber (horizontal climbing), which is climbing on a horizontal plane combining a walk along with posturing. The spider monkeys observed in this study used both methods of climbing to get from one part of their enclosure to the other. They were observed using their hands and tail to aid them in climbing more than their feet. Often times they would halt mid-climb simply hanging by their hands mid-air. Swinging, and swaying in place were also observed but were not counted as true climbing since they were not moving from one spot to another.

The other behaviors observed and recorded indicated that the spider monkeys spent more time climbing than walking or moving around. This was because they were usually found in the highest tree canopies of their enclosure. The only way to move around from one spot to another

this high in the enclosure was to climb. In fact, there were only a few instances when they were observed moving around on the ground level and this was only when they were eating or drinking water. In terms of resting, spider monkeys in general spent far more time resting than any other activity being recorded. In the wild a spider monkey's movement depends on the seasons and whether they live in a continuous forest or a fragmented one. If they live in a fragmented forest then the majority of their time is spent feeding, with less time being used for traveling (Chaves et al., 2011). Because the spider monkeys living in Brookfield Zoo live in a "fragmented enclosure" with limited space, this could very well account for the large amount of time they spend resting. They have a large variety of food that they do not have to travel far to find. While observing spider monkeys, we did not count a large number of occurrences when they in fact the lowest member in their social group. Spider monkeys did not spend a large amount of their time grooming, (only 3%) and this is due to the lack of a thumb present on their hands. Playing instances were counted as times they interacted with each other in a playful manner, times they interacted with capuchins in a playful manner and times they spent playing with their food enrichment toys. The majority of playing time being recorded was of the spider monkeys playing with their enrichment toys. When resting, spider monkeys were also recorded as being grouped together sitting on the high canopies of the trees. They were also seen moving together whenever they sensed that rain was about to come. As soon as they heard the sound of thunder the spider monkeys would descend from the trees and move on the ground towards the left back rock wall of their enclosure. They would

were eating. While there were a few instances recorded of them eating leafy greens, the vast majority of eating occurrences recorded were of them eating from an enrichment toy within the enclosure. Spider monkeys could be seen taking a long stick and dipping it into a thin tube. They would then pull the stick back out and lick whatever was on it. Only the spider monkeys were recorded using this enrichment food toy. There was also one observed instance when one spider monkey could be seen moving the one currently sitting at the enrichment toy out of the way in order to get at it. When they did eat food that was found on the bottom of their enclosure they would bring it with them up into the tree canopies to consume. A spider monkey's posture while eating in the wild has been recorded as suspensory, quadrupedal, and sitting (Scherbaum and Estrada, 2013). These postures were also seen in captivity at Brookfield while eating. They assumed the sitting posture while drinking water as well and only used their lips to drink the water.

The last group of behaviors recorded were those in which the spider monkeys interacted with each other. Grooming, playing, and instances grouped together were all recorded and observed. Most of the spider monkeys were seen together in groups at all times during observations. With the only exception being the red-faced spider monkey named Esmeralda. Esmeralda was the loner of the spider monkey group and was seen resting in separate trees away from the others. After discussing this with one of the primate keepers, it was discovered that she was then ascend up the rock wall and stay there huddled together under the rocks to shield themselves from the rain. Only when the rain stopped would they then venture back out into the enclosure often times in groups of two or three. There were occurrences of positive interactions observed between the spider monkeys, and these behaviors were seen quite frequently. Embraces, and allo-grooming were all observed, which has also been observed in the wild as well (Rebecchini et al., 2011). Additional observations would indeed provide greater insight on the social interactions between spider monkeys in captivity. Studies on social interactions can also reveal whether captive spider monkeys are capable of having traditions. In the wild, scientists have uncovered that spider monkeys are one of the few animals that are capable of having traditions and sharing them with their offspring. To this point there has not been research done on whether this is possible with spider monkeys living in captivity. To distinguish if a behavior is considered a tradition, scientists look for behavioral variations that are not explainable through ecological or genetic factors, yet still persist (Santorelli et al., 2011). With further observations of captive spider monkeys we may be able to come to the conclusion that when the spider monkey reacts to rainfall before any sign of rain occurs, the behavior may be defined as a form of tradition. Studying the social interactions of captive spider monkeys over long periods of time (many years) could shed light to many new behaviors as well as explain why they act the way they do in captivity.



Capuchin Behavior

Like most New World monkeys, capuchins spend the majority of their time in high places and thus climb quite often. Though they do not venture as high in the canopies as the spider monkeys, the capuchins are very able-bodied climbers. Capuchins do move quadrupedally and can leap from tree to tree. They climb quadrupedally with a forward locomotion movement. This is defined as movement where the tail is being used to support the body while climbing (Monkey Matters, 2013). The tail is more useful in balance than it is for gripping branches. Out of the data gathered in observations, the capuchins at Brookfield Zoo did spend a good majority of time climbing, as 18% of their recorded activity being observed. However one variable, which was not accounted for, was the fact that they would not be present in their enclosure every day. There were four days in which the capuchins were not present at all in their enclosure. This meant that there would be fewer observations and data points gathered for the capuchin. After inquiring about this with two of the primate keepers it was discovered that the capuchins are taken out of the enclosure when they misbehave or bother the spider monkeys. The keepers indicated that the capuchins tended to cause trouble with the spider monkeys, especially Esmeralda, the red-faced spider monkey. Animals are also switched out in this large enclosure frequently so that a variety of animals can utilize the space.

Capuchins were observed moving much more often than the spider monkeys. The three capuchins were observed walking on the ground level of their enclosure, as well as walking on the right hand side rock ledge at the back of the enclosure. This was where they spent the majority of their time pacing back and fourth on the small rock ledge. This pacing movement is an indication of boredom that is seen in many captive capuchin monkeys. Another indication of bored, neurotic behavior was observed in all three as they walked to the back wall of the enclosure then pushed themselves off of it while throwing their heads back. All three capuchins were observed doing this at Brookfield Zoo. They have a short attention span and if not constantly stimulated can become bored and depressed. Capuchins have the largest brain-to-body ratio of any non-human primate, which helps explain their incredible intelligence (Fragaszy et al., 2004). In order to keep this primate happy and healthy in captivity they need constant stimulation. This may account for why they spent a shorter amount of time resting than they did moving or climbing. The three capuchins also moved around on the ground level, often times walking the entire expanse of their enclosure. There was virtually no area where the capuchins were not seen walking or climbing at some point in time during observations. The capuchins were also seen eating quite often and would often carry their food with them to higher points in the enclosure. Whenever food was visibly present there was at least one capuchin eating. They were also seen self-anointing themselves with some of their food, presumably the onions. This behavior is described as when the monkey will take the food and proceed to rub it all over their bodies, and it is usually done with very strong scented foods.

Capuchins spent the vast majority of their time grouped together, often times all three were seen sitting or moving around together. They were observed grooming each other far more often than those of the spider monkeys, though in capuchin society grooming is a popular activity. Their hands, which do have an opposable thumb, also help them easily groom others. While there were many instances of all three capuchins grooming each other there was one instance where a lone spider monkey was groomed for only a few seconds by one capuchin. However, the two other capuchins quickly made the spider monkey leave the area by making threatening calls, and lunging at the monkey. The capuchins also were seen playing in their enclosure and they would often times take ropes and vines and proceed to smash them together or against the trees or rocks. At other times, they would simply take the rope and try to pull it down from wherever it was anchored to. Playtime also involved the spider monkeys as well. The three capuchins would often chase the one spider monkey that ventured into their part of the enclosure and at some points the spider monkey would chase the capuchins. One capuchin went so far as to grab the spider monkey's tail and give it a pull before quickly running away. Out of both species being observed, the capuchins engaged more with each other, the other spider monkeys and the enclosure itself. It appeared as though a common game for the capuchins was trying to get the spider monkeys to move from their high perch on the trees to come down to where the capuchins were. To do this the capuchins would make calls to them, try lunging at them, or even pull on the ropes the spider monkeys were hanging off of. The capuchins ability to manipulate objects, as well as other animals, shows just how intelligent they are. Further studies could be conducted focusing on capuchin's social interactions with each other as well as other species, if they share their enclosure with multiple species. The capuchins observed were seen quite often sharing their food with each other. Additional studies/observations could be done at Brookfield to find out the amount of time capuchins spent sharing. Prior studies have proven that capuchins understand sharing and the value of objects. By conducting experiments with different foods, we could distinguish which foods and toys the capuchins are willing to share with each other. Since capuchins have been documented in captivity working together to solve a new task, it would be interesting to see how the capuchins at Brookfield would fare. Prior studies done on captive capuchins have shown that these animals learn a new task more readily when they work and act together (Adessi et al., 2011). Because of the capuchin's vast intelligence and problem solving skills, additional studies should be conducted on the capuchins at Brookfield Zoo to find correlations with their behaviors and intelligence levels. Free-ranging zoos in Europe have had limited success in allowing capuchins to roam due to their destruction of natural habitats (Jens et al., 2012). Understanding the proper stimuli for capuchins could help them become more active and involved in their enclosure, without systematically destroying it. Proper enrichment can also prevent the neurotic behavior that captive capuchins are known to do when bored.

Enrichment and Enclosure Design

Continuing to change and adapt the enclosures of these primates could also provide a form of enrichment, which can no doubt benefit their mental health. Providing additional space, or access to more space, along with the addition of stimulus objects, have proven to be successful techniques used by other primate keepers (Renner et al., 2000). Updating enclosures can help support a wide range of behavior for captive zoo animals. Decreased abnormal behavior has been observed in primates that have had additional enrichment added to their enclosures. Renner et al. (2000) points to research done with macaques

and chimpanzees, where additional enrichment and enclosure space yielded less self-injurious acts. Other zoos utilize enclosures that are made to reflect the desired habitat for primate species (Jens et al., 2012). Brookfield Zoo's Tropic World is quite large, with large trees, vines, and boulders in which to climb. These natural aesthetics offer enrichment for both species of primate, which help deter abnormal behaviors. To accommodate species-appropriate behavior, enclosures need to have adequate space for resting, locomotion, and sanitation (Tresz, 2010). The shared enclosure space in Tropic World is quite large and is adequate enough to accommodate the behaviors of both species. However, if additional species were added or additional numbers of capuchins or spider monkeys were, the space would no doubt have to become larger to accommodate the increase in population. Another option utilized in zoos to encourage enrichment is "contra freeloading" or working for food. Studies done at Phoenix Zoo focused on providing enrichment tools in animals' enclosures that allow the animal to work for their food. Tresz (2010) indicates foraging is a time-consuming process that involves searching, retrieving, or acquiring food. Allowing foraging gives captive animals a chance to work for their food, a task that takes up a large portion of their day in the wild. Brookfield Zoo utilizes foraging forms of enrichment for both the capuchins and spider monkeys. Substrate that was observed being used include wood chips, and large amounts of leafy greens, which hid fruits. Improving physical and social housing conditions, providing sensory stimulation and opportunities for cognitive challenge can help improve the health and well-being of primates in captivity (Rimpley and Buchanan-Smith, 2013). Spider monkeys and capuchins are very active, social, and intelligent primates that need proper stimulation in order to remain mentally and physically healthy. Providing proper enrichment and implementing a naturalistic enclosure design can help their mental well-being. Brookfield Zoo should continue to look for additional ways in which to advance their enclosure or their enrichment toys so that both species continue to remain active and healthy in the future.

Conclusion

The results of this study indicate that spider monkeys spend more time climbing than the capuchin monkeys at the Brookfield Zoo. However, when looking at overall movement vs. time resting, the capuchins were observed moving much more than the spider monkeys. These findings seem to validate what we know about these species' behaviors. Spider monkeys spend a great deal of their time climbing through the forests in their native habitats in South America. Capuchins with their superior intelligence can easily be bored in captive settings, which can often lead to restless, and mischievous behavior. This mischievous behavior was observed with the capuchins at Brookfield Zoo and their ability to aggravate the spider monkeys that shared their enclosure. Both species moved around their enclosure quite frequently, however it was the spider monkeys that were observed resting more often at 13.56% of the time. To encourage active behavior for both the spider monkeys and capuchins, zoo keepers can provide ample areas to climb, and an abundance of enrichment toys. Designing the habitat to be naturally aesthetic will keep both species happy and occupied.

The greatest challenge in this inquiry project was the lack of knowledge in regards to the animals schedule at Brookfield Zoo. This is due to the capuchins being off exhibit for four of the observational days. Because of this it was difficult to collect enough data points in order to analyze. Further studies of capuchins as well as spider monkeys located in zoos will be more successful if the proper planning is utilized. This planning includes speaking with the keepers of the exhibit and obtaining a copy of the animals schedule if possible. This will then help the researcher plan the days of observation, only observing on days where both species will be present in their enclosure. Obtaining the animals' schedule can also lead to more insight on their eating patterns, their sleep patterns, and how they interact with others. More information on the personal care of these primates needs to be obtained so that it can be included in any future studies. Studying both species of primate in a captive setting can shed light on to their behavior patterns in captivity. Additional observations would no doubt add to the quality of life for these animals and provide keepers with useful information on their behavior patterns.

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Introduction

Introducing a new pair of tigers for a first time breeding recommendation can result in an injury or fatality if the pair is not compatible, or if the female is not in estrus (Saunders et al., 2014). Risk may be even more prevalent if either of the tigers has not bred before and are lacking in experience. Fortunately, tigers have a variety of communication signals that indicate when a female is in estrus. Smith et al. (1989) recorded frequency of scent marking and repeated roaring or moaning to classify wild female tigers as being in estrus. Tigers also make a sound known as chuffing, which is translated as a friendly communication signal.

The National Zoo received a recommendation to breed a new pair of Sumatran tigers (*Panthera tigris sumatrae*). The 12-year-old male (Kavi) was an experienced breeder. The 4-year-old female (Damai) had no breeding experience. The tigers had approximately six months of "howdy" access, where they could see each other through a mesh barrier without having direct physical access. After months of observing positive reactions from this pair, we felt comfortable going forward with the physical introduction. This particular female was extremely friendly to the male tiger and to the staff, almost all of the time. She frequently chuffed, rolled, scent marked, called and head rubbed. Due to this constant showing of common estrus signals, daily behaviors of the female were recorded during the breeding introduction months to pinpoint a cycle pattern that keeper-staff could readily identify. Behaviors of the male tiger were also recorded throughout this time.

Methods

The following information (cycle length, cycle interval, and behaviors) was recorded daily, beginning when the Sumatran tigers were introduced for breeding in November 2012 through the confirmed pregnancy of Damai in June 2013. Behaviors recorded for the female included: rolling, calling, lordosis, breeding

Tiger Talk – Utilizing Common Communication Signals to Identify Estrus in a Sumatran Tiger (*Panthera tigris sumatrae*)

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and rejection of the male's attempts to breed. Behaviors recorded for the male included: chuffing, calling and breeding.

Results

Cycle Length and Interval:
The average length of Damai's estrous cycle during the months observed (November 2012-April 2013) was eight days long. This was based on observed breeding. The interval of this estrous cycle occurred on average every 31 days during the breeding period observed. Interval was counted as day 1 being the first day of ending estrus up until the next observed beginning of estrus.

Female Behaviors:
Damai's breeding behaviors were as expected – plenty of calling, rolling and chuffing. She displayed lordosis on actual breeding days and rejected the male's attempts a few times near the end of her cycle. The amount (%) of her calling did increase, but not significantly enough to indicate the onset of estrus compared to her usual amicable behaviors.

Male Behaviors:
Kavi's breeding behaviors provided more information than Damai's with regard to calling as he was increasingly more (%) vocal during Damai's estrus. The unusual finding was that he only chuffed at her when she was in estrus; rarely in-between cycles. In fact, he was not ever observed chuffing at her, up until the week we began introductions.

Looking back, we could have identified estrus in this female solely by listening to the male tiger chuff at her. After we confirmed pregnancy in this tiger, and breeding introductions had concluded, the male chuffed at her regularly.

Conclusions

Results of this case study reveal that in this particular pair of tigers, it may be possible to determine estrus of the female based on the following behaviors of the male:

- An increase in calling during breeding period.
- Chuffing. This male only chuffed when the female was in estrus, or just before a heat cycle began (Fig. 1). He rarely chuffed in-between cycles.

This tiger's estrous cycles lasted on average eight days, with a 31 day (average) interval between cycles. This supports other findings (Seal et al., 1985). Smith et al. (1991) observed an increase in calling a week before encountering a male, followed by breeding roars for two days.

While this same pattern of behavior will not be the same for every breeding pair of tigers, this case study is an example of how listening to breeding signals from the male tiger can be just as beneficial as the females' signals when planning breeding introductions. In this case, the male's signals turned out to be much more definitive.

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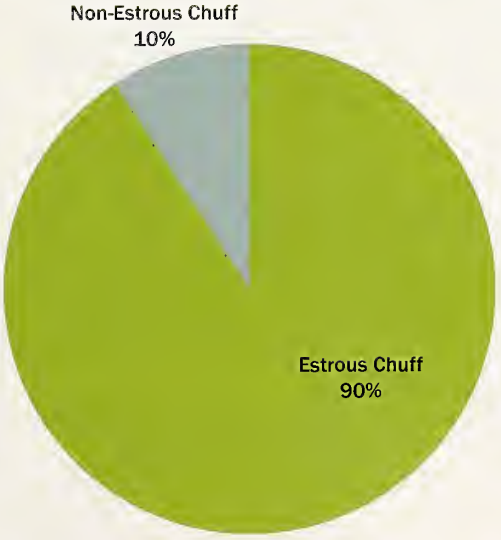
Figure 1. Male Tiger Chuffing at Female: Observed During Female's Estrous and Non-Estrous Periods



Benefits of Short Training Sessions

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There are countless husbandry benefits to training the animals we care for every day. Most keepers would probably agree that they enjoy time spent training and have seen the benefits of daily training sessions. One of the biggest obstacles standing in the way of training has always been lack of time. As keepers, we work busy schedules and time is never on our side. Overcoming time constraints and fitting even the shortest of training sessions into our day can be difficult, but can have very beneficial outcomes for both animals and keepers.

One of the training experiences that I am most proud of is the work I did with a pygmy slow loris (*Nycticebus pygmaeus*) named Roach during my employment with the Duke Lemur Center (DLC) in Durham, NC.

When Roach first moved into my care, he was around six-months-old and so elusive that I struggled to find him in his dark, 'nocturnal room'. He was difficult to get eyes on and I would occasionally have to get other keepers to help me find him. This reclusive behavior was problematic as I needed to see him in order to learn his normal behavioral patterns and provide him with the best care.

While working a heavy schedule in a very fast-paced environment, I challenged myself to find a few minutes every day to fit in short training sessions, pairing these sessions with Roach's feeding schedule. The sessions were less than five minutes long, and occurred twice a day during time that was already designated for getting visuals on and feeding Roach and his aye-aye (*Daubentonia madagascariensis*) roommate Kali.

I officially started training with Roach when he was seven-months-old with the goal of getting voluntary weights on him. This process started with desensitization sessions that involved hand feeding Roach high-value food items from his diet such as worms and pieces of fruit. Roach was very skilled at hiding under fleece blankets placed in the room for his privacy, under nesting material provided for his aye-aye roommate, and hanging high up in a corner of the room. The next step was to reinforce him for making himself visible to me when I was in his room.

In January of 2013, I introduced a whistle as a bridge, and the sound of his food bowl being shaken as his cue to "come to me". Due to the setup of the nocturnal room, Roach was required to come down the branching or metal pole frames to my level so that I could have the most access to him. Only a few days into the start of his training Roach began coming down to my level to receive his worms or fruit. His worms and fruit were never withheld on days that he did not participate in training. On those days it was put into his food bowl and left for him to eat on his own. Weight issues were a concern with many of the pygmy slow lorises at the DLC, so extra food for training was saved only for important training milestones.

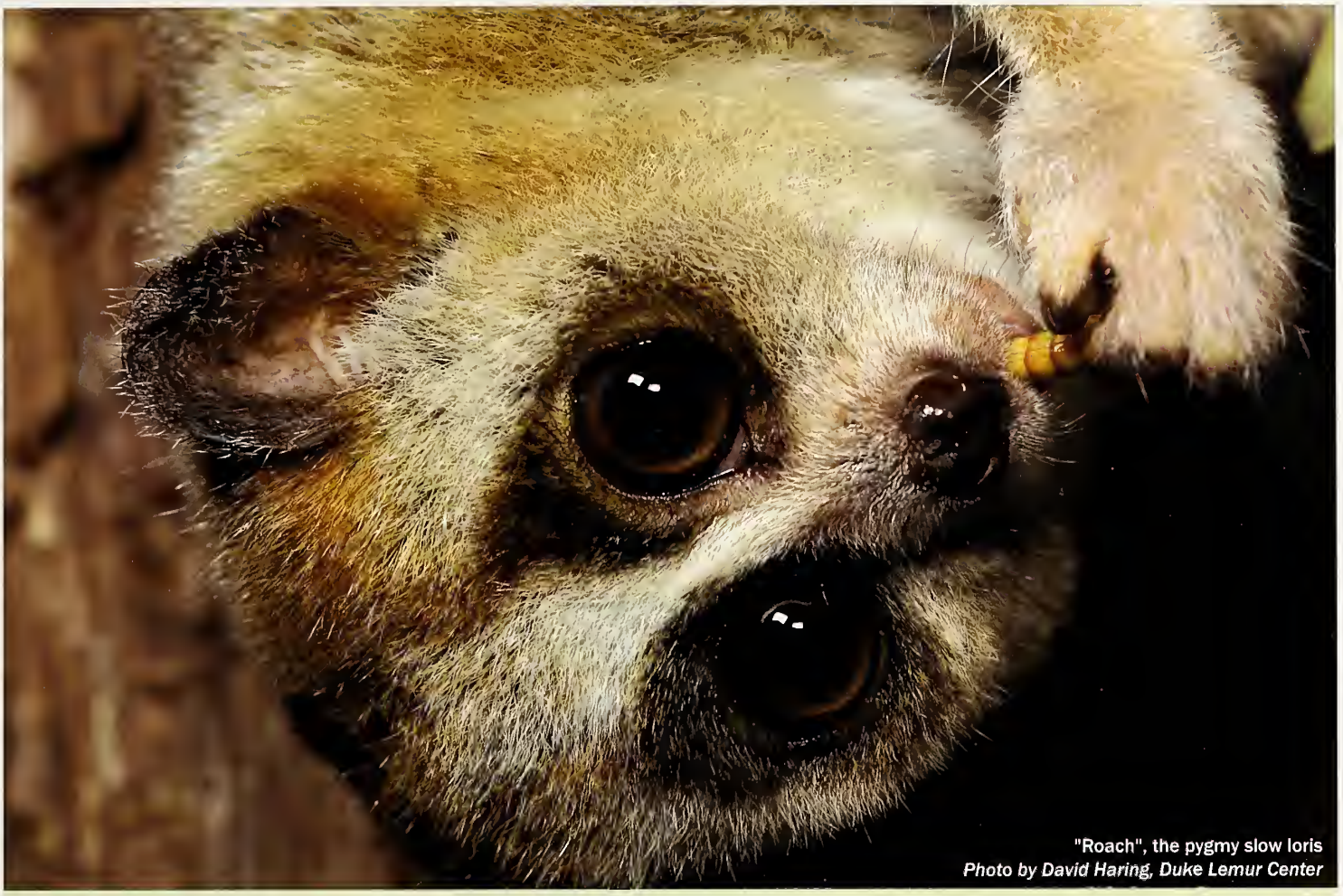
Once Roach was consistently coming out for training sessions I focused on stationing him in the most ideal location for a scale to eventually be introduced. The location that worked best for a scale was on top of a nest box. Within the first month of training, Roach began running across the room to me before I even cued him. This progress was seen at both feeding times. On occasion, I would take the opportunity to station him at various locations throughout his room. By the second month, stationing Roach at multiple locations in the room became part of his daily training.

Another milestone for Roach was the introduction of other staff in the room during training sessions, which proved to be challenging at first. I was excited to share the progress Roach was making with my coworkers but, unfortunately, if anyone else entered the room he would run away and hide. We tried various ways of having other people enter the room to get him comfortable with more than one person in his space. Two of the methods included having someone silently enter the room during the session, or starting the session with someone quietly standing by the door. By his third month of training, Roach was less and less fazed by the additions and would come running from wherever he was in the room to participate in his sessions, even with multiple people present.

Due to having other animals under my care and time constraints, I took my training with Roach very slowly. I focused on building a positive relationship with him. I believe that because I moved so slowly with our training when the time came to introduce a scale for voluntary weight training, he was successful on the first day. The scale was introduced to Roach after we had been training for about a year. Finding the ideal scale was the hardest part in scale training Roach. Once the perfect-sized scale was located at the DLC, I placed it on top of the nest box that Roach had been desensitized to and cued him to come over to it. With slight hesitation (mostly due to Kali being in his way) Roach came down and sat perfectly on the scale! From that moment on I was able to get voluntary weights on Roach anytime I needed.

After Roach was successfully scale trained I focused on continuing to get him comfortable with more people in his room, other staff training him, and working toward voluntary restraint training. Throughout the process I learned a lot about Roach. I learned that he trains best alone; simultaneous training with Kali did not work for him. He was also very sensitive to noise coming from outside the nocturnal building, noise coming from cleaning other nocturnal rooms in the building, and people talking outside of his room.

Successfully overcoming the various obstacles that came up during training Roach made this experience that much more rewarding. Through scale training, I set myself up to provide better overall care to Roach and also reduced the stress to him by eliminating the need to restrain him to get a weight. This progress was all possible despite not having a large amount of time to dedicate to training sessions. Sometimes a few minutes spent training can make a world of difference!



"Roach", the pygmy slow loris
Photo by David Haring, Duke Lemur Center

BHC comments by Jay Pratte:

So I have presented lectures and workshops about training at conferences around the world, and easily one of the top three "complaints" or problems animal caregivers EVERYWHERE bring up is "not having the time to train". (The other two, incidentally, being "my manager/vet/lead/etc won't let me train", and "my animal isn't food motivated"). Every keeper has this problem at some point. We're short-staffed, building a new exhibit, too much work to do... There are any number of obstacles in our way. What we need to do, and what the author addresses very well, is look for ways to OVERCOME these obstacles.

At some point in your day, you are going to need to do a visual check on your animals. You will also need to feed, clean, etc. These are all opportunities to interact with, build a relationship with, and teach your animal(s). A training session does not need to be a 20 minute, structured, get-all-the-equipment-together-and-food-prepared type of thing. As the author outlines, take a handful of the animal's favorite food item when you do a visual check and ask them to come over. That 30 second interaction is still a teaching moment, and builds strong, rewarding associations with your presence. While you may not see huge progress right away, the incremental building on this foundation of trust and rewards will pay off in the end. Like Roach, a year later, a new scale is no big deal. Be creative, and find a bit of time in each day for each animal. It will be worth it.

We want to hear your Training Tales – the good, the bad and the fabulous!

Please submit your "Training Tales" and experiences in operant conditioning to share with *Animal Keepers' Forum* readers. This opportunity provides a convenient outlet for you to exhibit your training challenges, methods and milestones with the AAZK member network. Please submit entries based on the following guidelines:

1) Submit a brief description of a training project at your facility. These can be 500 words or less, in text or bullet points – it can be longer (up to 1000 words); however, short and simple descriptions with a few images are just as perfect. Details should include the following:

- Define the training goal (what did you try to do and for what purpose?)
- List important steps (How did you do it – include plans that changed along the way/what worked and what didn't work)
- Timeline used (how long did it take)
- Tips you learned along the way

2) Include 3-5 digital photos that clearly depict the animal in the learning process or performing the desired goal (provide photo caption and photographer of each image). Photos need to be 300 dpi and at least 1200 x 1800 pixels.

Please send submissions or questions to:
Kim Kezer at kkezer@zoonewengland.com or
Shane Good at shane.good@aazk.org
(Use Training Tales Submission as the subject).

Polar Bears International Conservation Grant Supports All Species, Even Salamanders

Lauren Augustine and Matt Neff, Smithsonian's National Zoological Park

In 2015 the Polar Bears International Conservation Grant was awarded to Chopsticks for Salamanders (CFS), an initiative of The Foundation for the Conservation of Salamanders (FCSal).

CFS was started in 2011 with the goal of raising awareness about the staggering international deforestation caused by the production of disposable chopsticks, and provides a reusable alternative to their use. China alone produces as many as 80 billion pairs of chopsticks each year, costing the world 20 million trees annually. Fortunately, Asian activists started the "Bring Your Own Chopsticks" movement in 2006 and started pushing for social change to reduce use of disposable chopsticks. The "Bring Your Own Chopsticks" movement was the inspiration behind CFS, which hopes to educate American consumers about the wasteful production of disposable chopsticks, encourage forest stewardship and educate consumers about sustainable use alternatives to disposable products.

To apply for this grant go to: www.aazk.org/committee/grants-committee/

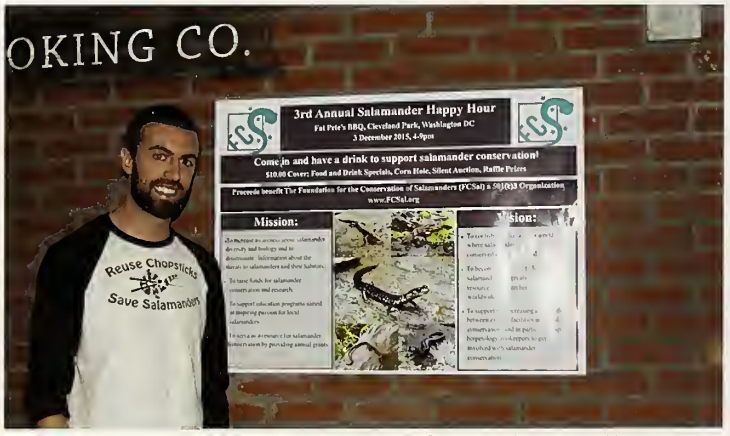
Initiatives to reduce deforestation are critical to improving the health of ecosystems globally. Because trees remove carbon dioxide from the atmosphere, large forests serve as critical carbon sinks. Preserving them benefits all species, particularly arctic species which are already affected by climate change. In addition to encouraging consumers to purchase products which help prevent deforestation, Chopsticks for Salamanders raises funds through the sale of reusable, stainless steel chopsticks. All proceeds generated by CFS benefit research and conservation aimed at protecting salamanders worldwide. Because salamanders are so sensitive to temperature changes in the environment, they will be some of the first temperate vertebrates to feel the effects of climate change. Salamander protection is particularly important in the United States, which hosts more salamander species than any other country in the world. Sadly, a staggering 40% of American salamanders are considered at risk, making our mission more critical every day.

The money generously awarded by the Polar Bears International Conservation Grant was used to purchase supplies to aid in the effective communication of the CFS mission to the general public. CFS saw an increase in participating organizations in 2015, including the Houston Zoo AAZK Chapter, Brevard Zoo, Oklahoma City Zoo, and the Jacksonville Zoo AAZK Chapter. All these organizations required chopsticks, educational trifolds and business cards to include in chopsticks packs. Because of the generous support of PBI, CFS had the extra funds to purchase chopsticks and educational materials in bulk for the first time, saving our organization $700 per thousand pair of chopsticks and generating that much more money for conservation. In addition to trifolds and business cards, four large posters were designed and printed to promote CFS. Two were exhibited at the American Association of Zoo Keepers' National Conference where they reached an audience of approximately 300 people. These posters educated attendees about Chopsticks for Salamanders and were significant in gathering additional support. The additional posters were used at the second annual Salamander Happy Hour in Washington, D.C., a successful event that reached over 100 attendees, many of whom were learning about CFS for the first time. The sale of chopsticks through partner organizations, as well as fundraising events like the Salamander Happy Hour, will help fund the annual $5,000 conservation and research grant. Our current grant cycle was opened 1 November 2015 and the recipient will be announced in February. To date, FCSal and CFS has awarded over $15,000 in funds towards the protection of salamanders and their habitats.

FCSal is extremely grateful to Polar Bears International and the American Association of Zoo Keepers for the support. We would also like to thank the growing number of local AAZK Chapters which have supported CFS and FCSal since the beginning.

To learn more about FCSal or CFS, visit us online at FCSal.org.

FCSal President, Lauren Augustine with one of the posters generously funded by PBI. Photo by Chelsea Grubb.



FCSal Vice President, Matt Neff at the annual Salamander Happy Hour. Photo by Chelsea Grubb.

Here you will find a full listing of our standard line of zoo and aquarium animal toys, shelters, and other products designed to enhance the lives of animals of all kinds. Choose from balls, boxes, cylinders, discs, pills, and more complex shapes, as well as our line of station markers for animal training and education. You can even engage your animals sense of smell using our scent kits, which allow you to change scents as often as your animal would like!

Our products are available in our full range of colors, and most can be ordered in various sizes and weights, such as light, medium, heavy duty and extra heavy duty.

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